MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

WASHINGTON, D. C., MAY, 1882.

WAR DEPARTMENT,

OFFICE OF THE CHIEF SIGNAL OFFICER,

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

This REVIEW presents a general summary of the meteorological data collected by the Signal Service during the month of May, 1882.

In the preparation of this REVIEW have been used; viz.: the regular tri-daily weather charts, containing the data of simultaneous observations taken at one hundred and thirty-six Signal Service stations and thirteen Canadian stations, as telegraphed to this office; one hundred and eighty-three monthly journals and one hundred and seventy-four monthly means from the former, and thirteen monthly means from the latter; two hundred monthly registers from voluntary observers; fifty-three monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; Marine Reports through the co-operation of the New York Herald Weather Service; abstracts of Ships' Logs, furnished by the publishers of "The New York Maritime Register;" monthly reports from the local weather services of Kansas, Nebraska, and Missouri, and of the Central Pacific railway company; trustworthy newspaper extracts; special reports.

The more prominent meteorological conditions of the month have been:

1. The deficiency in temperature, which except in California, has been in all the other states and territories, below the mean for the month, averaging 5° below in New England, the middle Atlantic states, and Tennessee, 6° below in the lake region and the Ohio valley, and 7° below in the northwest.

2. The great excess of rainfall in the Ohio valley, amounting to more than four and five-tenths inches, and in Tennessee and the lower lakes, amounting to nearly three inches. In Arkansas the rainfall has been unusually heavy (especially in the vicinity of Little Rock, where the amount exceeded fifteen inches), but owing to lack of data from that section in previous years, comparison cannot be made. The excessive rainfall and continued cold has had a depressing effect, it is reported, on the cotton crop, but from all states the prospects are very encouraging for fruits and cereals.

A new feature of the WEATHER REVIEW is continued under the head of "Cotton Region Reports." The Chief Signal Officer began in April a system of daily telegraphic reports for the benefit of those interested in this staple, and the accompanying table gives the monthly mean of the maximum and minimum temperatures and the average rainfall for the month, in the various cotton districts throughout the south.

That part of the REVIEW referring to international meteorology presents the general weather conditions which prevailed over the northern hemisphere during the month of March, 1880, and the tracks of barometric minima for June, 1880, traced from simultaneous observations taken at 7:35 a. m., Washington mean time.

A large number of icebergs were encountered by vessels during the month. The comparison of chart vii. with that of April, shows that the limits within which ice was observed did not extend as far southward and westward during the present month, but it still suggests the advisibility of selecting the southern routes for vessels passing to and from Europe at this season of the year. Under the heading, "Ocean Ice" will be found special reports giving the latitude and longitude in which icebergs were observed.

BAROMETRIC PRESSURE.

The mean barometric pressure for the month over the United States and Canada is shown by the isobarometric lines, in black on chart ii. The area of lowest mean pressure is central in Arizona and New Mexico. An area of high pressure, belonging to the high barometer of the Atlantic ocean, extends over the middle Atlantic and south Atlantic states. The barometer is highest on the coast of Oregon, and Washington territory. A comparison of this chart shows an approach to the usual distribution of pressure in summer, a low area covering the interior of the continent. Compared also with the previous month the pressure is slightly higher in New England, Saint Lawrence valley, the Canadian maritime provinces, and in the north Pacific coast region, but is nearly one-tenth of an inch lower at stations in Montana, Dakota, and Minnesota, and thence to Arizona, New Mexico, and northern Texas.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

Compared with the means of previous years, the pressure over the country east of the Mississippi river below the forty-third parallel of latitude and in Maine, ranges from normal to nine-hundredths of an inch below the normal; in the upper lake region it is from three-hundredths to seven hundredths of an inch above the normal; in the extreme northwest and upper Missouri valley, it ranges from two-hundredths to eight-hundredths of an inch above the normal; in the west Gulf states and the north Pacific coast region it is about normal; at Rocky mountain stations, from two-hundredths to five-hundreths of an inch below the normal; and in southern California it is slightly above the normal.

BAROMETRIC RANGES

The range of pressure during the present month has varied from twenty-nine hundredths of an inch to one and seven hundreths inches. The least range being at Key West, and the greatest at New London, Connecticut. In the several districts the barometric ranges have been as follows:

New England: from 0.76 inch on summit of Mount Washington to 1.04 inches at New Shoreham and 1.07 inches at New London.

Middle Atlantic states: from 0.82 inch at Lynchburgh and 0.83 inch at Williamsport, to 1.01 inches at Barnegat and Sandy Hook and 1.03 inches at New York.

South Atlantic states: from 0.48 inch at Jacksonville to 0.80 inch at Hatteras and 0.82 inch at Kittyhawk.

Florida peninsula: from 0.29 inch at Key West to 0.41 inch at Cedar Keys.

East Gulf states: from 0.48 inch at New Orleans to 0.62 inch at Starkville, Mississippi.

West Gulf states: from 0.47 inch at Port Eads to 0.77 inch at Denison and 0.82 inch at Fort Gibson.

Rio Grande valley: from 0.61 inch at Brownsville to 0.83 inch at Eagle Pass.

Ohio valley and Tennessee: from 0.64 inch at Memphis and 0.66 inch at Chattanooga to 0.82 inch at Pittsburgh.

Lower lake region: from 0.81 inch at Sandusky and 0.82 inch at Erie and Toledo to 0.87 inch at Buffalo, Detroit and Rochester.

Upper lake region: from 0.57 inch at Duluth and 0.62 inch at Marquette to 0.91 inch at Port Huron and 0.96 inch at Alpena.

Extreme northwest: from 0.62 inch at Fort Buford to 0.82 inch at Bismarck.

Upper Mississippi valley: from 0.70 inch at Cairo to 0.83 inch at Keokuk and 0.84 in at Springfield, Illinois.

Missouri valley: from 0.73 inch at Springfield, Missouri, to 1.03 inches at Fort Bennett, Dakota.

Northern slope: from 0.58 inch at Fort Assinniboine and 0.59 inch at Fort Keogh and Fort Washakie to 0.99 inch at North Platte.

Middle slope: from 0.58 inch on the summit of Pike's Peak to 0.90 inch at Dodge City.

Southern slope: from 0.49 inch at El Paso to 0.80 inch at Jacksborough and 0.83 inch at Henrietta.

Southern plateau: from 0.37 inch at Camp Thomas to 0.60 inch at Santa Fé.

Middle plateau: from 0.43 inch at Pioche to 0.55 inch at Winnemucca.

Southern plateau: from 0.49 inch at Eagle Rock to 0.80 inch at Umatilla and 0.81 inch at Fort Missoula.

North Pacific coast region: from 0.58 inch at Roseburg to 0.71 inch at Olympia and 0.72 inch at Portland.

Middle Pacific coast region: from 0.41 inch at San Francisco to 0.46 inch at Red Bluff.

South Pacific coast region: from 0.35 inch at Campo to 0.49 inch at Yuma.

AREAS OF HIGH BAROMETER.

Five well-defined areas of high barometer have appeared within the limits of the chart for the month of May, 1882. These areas have pursued a general track to the south of east; two were first noted in the northwest; one over the lake region and pressing southward; one in the maritime provinces of Canada, and the fifth in Washington territory and Oregon. An examination of the chart of areas of low barometer (chart i.) shows the great influence exercised by high area number ii. in stopping the progress of storm-centre number i.; also of the influence of high area number iii. in delaying the movement of storm-centre number ii. for three days in the Ohio valley.

I.—On the first there was a sharp rise in barometric pressure in the northwest and in the upper lake region. This high area was situated between a low area in the maritime provinces of Canada and a great depression entering the north Pacific coast region. On the second the high barometer moved slightly to the south of east over the lake region and Ohio valley to the middle Atlantic coast; at the midnight observation of this day fair or clear weather was reported from all stations east of the Mississippi river. At the morning observation of the third the isobar of 30.4 included Lynchburg, Washington, Chincoteague, and Baltimore; during the day there was a general fall of pressure east of the Rocky mountains, the sharpest fall being in the lake region and New England, and at the midnight report the highest isobar, 30.1, included the south Atlantic states. During the fourth this high barometer disappeared from the chart in advance of low area i. then entering Kansas, Colorado, Iowa, and Missouri. During the progress of this high area from Dakota to the Atlantic coast, the pressure at the centre of the high barometer averaged 0.3 inch above the mean for the month.

The minimum temperatures for the month are associated with this area, in the northwest, lake region, Ohio valley, middle states, and New England. Cautionary off-shore signals ordered on the second, in connection with this high pressure, from Sandy Hook to Chincoteague were justified by the following velocities: Chincoteague, 29, nw.; Delaware Breakwater, 40, nw.; Cape May, 36, nw.; Barnegat, 32, nw.; Sandy Hook, 36, nw. Cautionary signals were displayed on the second on the North Carolina coast, and the following maximum velocities were reported: Macon, 32, e.; Hatteras, 44, ne. Kittyhawk, 41, ne.; Cape Henry, 27, n.

II.—On the fourth, during the march of low area i. over Kansas and Missouri, there was a sharp rise of pressure over the northern portion of the lake region, accompanied by brisk to high northeasterly winds, light rain and a decided fall in temperature. On the fifth this high area, which barred the natural track of depression i.. pressed steadily to the southward, with a rise averaging 0.3 inch in the northwest and 0.2 inch in the lake region, middle states and, New England, with a marked fall of temperature in the same districts, the thermometer being nearly 20° below the mean for the month. On the sixth, the high barometer extended over the lake region, middle states, and New England; on this day low area i., which had entered Illinois, was filled up by the inflowing air and ceased to exist as a depression; in the mean time a new depression low area ii. was developing in the Rio Grande valley.

On the seventh, the region of highest barometer was transferred to the middle Atlantic states, which were enclosed by the isobar of 30.4, as well as Connecticut and Rhode Island; the pressure in the upper lakes yielding in the meantime before the advance of low area ii. On the eighth, during a sharp fall of mercury in the middle states and New England, the high area was transferred to the south Atlantic states, and on the ninth this area disappeared before the advance of low area ii., which had begun to recurve to the eastward and was then central in the northwest. In connection with the steep barometric gradient existing between this high area and low area i., cautionary signals were ordered for the lake region, and the following maximum velocities were reported: Erie, 27, ne.; Sandusky, 37, ne.; Toledo, 54, e.; Port Huron, 41, ne; Chicago, 27 ne.; Milwaukee, 32, n.

III.—On the tenth, the barometer rose 0.3 inch in the maritime provinces while low area number ii. was entering the lower lake region. On the eleventh the pressure continued rising, and the increase of pressure extended over New England and the middle Atlantic states, delaying the advance of depression ii. to the eastward. On the twelfth the barometer remained high in the same region, and during its continuance on the tenth, eleventh, and twelfth, low area ii. remained nearly stationary in the Ohio valley. On the thirteenth the high area disappeared to the eastward beyond the limits of the chart.

IV.—On the tenth, the pressure rose 0.4 inch in Minnesota in rear of low area ii., then entering the lake region. On the eleventh the rise extended over Manitoba and all the northwest and upper lake region, the highest barometer reported, 30.34, at Fort Garry, being 0.4 inch above the normal for the month. On the twelfth, the highest barometer remained central over Manitoba and Minnesota, but the pressure rose over all the region from the lakes to the south Atlantic and Gulf coasts. On the thirteenth the high pressure maintained nearly the same location, remaining about 0.3 inch above the normal for the month. On the fourteenth and fifteenth, the barometer rose in all the states east of the Mississippi river, although the

pressure still continued highest in the northwest and lake region. On the sixteenth the center of high barometer moved to Illinois and Indiana; at the midnight observation, unusually clear weather prevailed in all the states. On the seventeenth there was a rapid transfer of the highest pressure to the maritime provinces of Canada, the highest readings at the midnight observation being Farther Point and Chatham, 30.44 or 0.53 inch above the normal. Also at this observation the barometer, except in a slight portion of the extreme northwest, was in all the United States above the mean for the month. On the eighteenth the pressure still continued rising in the maritime provinces, the highest barometers reported being Farther Point, 30.58; Chatham, 30.59; Halifax, 30.55; Sydney 30.6. It is worthy of note that although there was an area of low barometer in Dakota and Minnesota, fair weather prevailed in all the country east of the Mississippi river except along the New England coast, where cloudy weather, with brisk to high northeast winds and light rain were reported. The distribution of pressure observed in the maritime provinces and New England, giving a barometric gradient producing northeasterly winds, is generally accompanied by rain, first beginning along the coast and then extending inland. On the nineteenth there was a general decrease of pressure in all the districts, although the barometer still continued highest in Nova Scotia. On the twentieth this area, the most important of the month, ceased to exist as a high pressure. In connection with this area and low area ii., the minimum temperatures for the month generally occurred in the south Atlantic, Gulf states, and Tennessee.

V.—On the eighteenth there was a marked increase of pressure in Washington territory and Oregon; on the nineteenth the increase extended into Idaho; on the twentieth the highest pressure was central in Montana, where the barometer averaged 0.4 inch above the mean for the month. On the twenty-first, the high area moved into Dakota, and on the twenty-second, moved by a southeasterly course into Iowa and Missouri; twenty-third, the highest pressure was central in Illinois; on the twenty-fourth, it was very rapidly transferred to the middle Atlantic coast in advance of a rain-area approaching from the west, and on the succeeding day it ceased to prevail as a high area.

AREAS OF LOW BAROMETER.

Four areas of low barometer have appeared within the limits of, or approached the stations of observation during the month, which were sufficiently well defined to render it possible to approximately determine the positions of the centres at consecutive telegraphic reports. The tracks of the centres of these depressions are exhibited on chart i. Compared with May of previous years, the barometric disturbances have been less than the average for May.

The following table shows the number of areas of low barometer occurring during the month of May since 1874, as traced on chart i, of THE MONTHLY WEATHER REVIEW:

Month.	Year.	No.	Month.	Year.	No.
May,	1874,	8.	May.	1878,	13.
"	1875,	11.	"	1879,	14.
"	1876,	11.	"	1880,	10.
"	1877,	5.	"	1881,	5.

The following table gives the latitude and longitude in which each area was first and last observed during the month of May, 1882, with the average hourly velocity:

Areas of low barometer.	FIRST OBSERVED.		LAST OBSERVED.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	48°	124°	38°	88°	19
II.	29°	102°	40°	72°	17
III.	44°	123° 5′	46° 5′	61°	30
IV.	46° 5′	103°	45°	78° 5′	20.5

The storm-tracks of the present month are in general to the north of those of the preceding month, which was to be expected. The track of low area ii. is in the earlier portion of its course very unusual for May, as in that month storms seldom develop south of latitude 85° N. Perhaps the most remarkable feature of these storm-areas is the influence exerted by areas of high pressure in absolutely checking the progress of low area i., and of delaying depression ii. for two days in the Ohio valley, as will be seen more fully set forth in the detailed description of these storm-centres.

I.—On the first, a great depression, moving in an easterly track, entered Washington territory and Oregon, the lowest barometer readings averaging 0.35 inch below the mean for the month. On the second, the low area continued its easterly course accompanied by light rains in Idaho and Montana. On the third, the movement of the centre of depression was not well-defined but it evidently took a southerly path; at the morning report of the fourth the center was in Kansas; during the day the storm-area moved with an increase of energy to eastern Kansas. At midnight the lowest barometers observed were: Leavenworth, 29.48; Des Moines, 29.51; Omaha, 29.54, being below the normal pressure for the month 0.46, 0.45, and 0.4 inch respectively. Thunder-storms were reported form the Ohio valley, Illinois, Indiana, Missouri, and Arkansas. On the fifth, the storm-centre moved slowly to the east into Illinois, but its progress was checked by high area ii., which was then entering the lake region. The following heavy rainfalls were reported, in inches, during the prevalence of this storm: Champaign, 3.6; Springfield, Illinois, 3.57; Des Moines, 2.81; Cedar Rapids, Iowa, 3.25. On the sixth, the centre of low area was filled up by the in-flowing air from the high pressure in the lake region. The maximum temperatures for the month in the lower Missouri valley, Indian territory, and northwestern Texas were associated with this low area.

II.—On the fourth, the pressure was below the mean in the Rio Grande valley, and continued slowly decreasing until, at the midnight observation of the sixth, a storm of considerable energy was developed; the barometer at Eagle Pass, 29.38, was 0.53 inch below the normal. At this hour the distribution of pressure should be noted, as it will probably account for the anomalous direction of the movement of the storm-centre on the seventh and eighth. The pressure averaged 0.2 inch above the mean in the lake region, middle Atlantic states, and New England, and 0.3 inch above the mean in the Saint Lawrence valley, thus presenting an obstacle to the natural course of the low area to the northeast. At the same time, the pressure was about 0.25 inch below the mean in New Mexico, Colorado and Wyoming, and the depression for the next two days, followed very nearly the path of least resistance. On the seventh the storm-centre, increasing in energy, moved to the northward, as charted, the lowest barometric readings reported being: Dodge City, 29.3; North Platte, 29.36; below the normal, respectively, 0.57 and 0.53 inch. During the day the pressure increased along the Atlantic coast, being nearly 0.4 inch above the mean in the middle Atlantic states and New England, and decreased 0.4 inch in Nebraska. On the eighth, the storm-centre moved slowly to the northward, the lowest barometer reported being, at the morning observation at North Platte, 29.2, or 0.7 inch below the normal. While the storm-centre was moving on the eighth over Nebraska and into Dakota, there was a general decrease of pressure in the lake region, Saint Lawrence valley, middle Atlantic states and New England, and when this storm-area recurved to the eastward, as shown by the morning report of the ninth, the pressure was below the mean in all the districts just mentioned. On the ninth and tenth the depression moved in a southeasterly course and became central in Ohio, where the lowest pressures were 0.4 inch below the mean for the month; during these two days the barometer rose in the maritime provinces and New England, and at the midnight report of the tenth, a high pressure barred the natural track of the low area. For the next two days the storm-

centre remained nearly stationary in the states of Indiana, Ohio and Kentucky, while the barometer remained high in Canada and New England, and below the mean in all the southern states. General rains were reported from the northwest, lake region, Ohio valley, Tennessee, middle Atlantic states, and New England. On the thirteenth, at the morning observation, the centre of depression was near Cincinnati, and during the day it moved, but with diminished energy, to the North Carolina coast. On the fourteenth the low area pursued, showing but slight energy, a northeasterly track along the coast and beyond the limits of the chart. During the passage of the area the maximum temperatures for the month were reported, generally in Maryland, Virginia, North Carolina, South Carolina. Cautionary signals displayed on the Atlantic coast for this storm were generally justified by the following maximum velocities: Boston, 26, ne.; Block Island, 48, ne.; New London, 25, ne.; New Haven, 30, ne.; New York, 42, ne.; Sandy Hook, 47, e.; Barnegat, 48, e.; Atlantic City, 48, e.; Cape May, 41, ne.; Delaware Breakwater, 58, e.; Chincoteague, 28, ne.: Cape Henry, 36, ne.; Kittyhawk, 30, n.; Hatteras, 34, sw. The following vessel reports, furnished through the co-operation of "The New York Herald Weather Service," and the co-operating observers of the merchant marine, probably indicate the presence of this storm during its passa e eastward over the ocean: 14th, S. S. "Seminole" in N. 38° 26′. W. 74° 35′, barometer, 29.50, fresh ne. wind, rainy; 15th, S. S. "Ohio," in N. 30° 29′, W. 64° 52′; 29.47, sse, overcast, rainy; 20th, S. S. "Holland," in N. 43° 00′, W. 45° 21′; strong nw. gale, heavy beam sea.

III.—On the twenty-first the pressure fell below the mean on the coasts of Washington territory and Oregon, and continued slowly falling until the midnight observation of the twenty-fourth; on the twenty-fifth the centre of depression moved in a southeasterly track into northwestern Colorado, accompanied by light rains in its southern quadrant. On the twenty-sixth it continued a southeasterly course into northern Texas. The southeasterly course of this depression during the twenty-fifth and twenty-sixth is not an unusual one for areas of low barometer crossing the Rocky mountains; but after the midnight observation of the twenty-sixth the storm-centre pursued the more usual course to the northeast, moving on the twenty-seventh, into the Ohio valley, from which region severe thunder storms were generally reported. On the twenty-eighth the area of lowest pressure extended in an elliptical form over the middle and south Atlantic states, and Tennessee and the Ohio valley, and heavy rains and severe thunder-storms were reported from all those districts. On the twenty-ninth the storm-centre moved along the New England coast and beyond the limits of the chart. On this day occurred the lowest barometric readings observed during this depression: Block Island and Provincetown, 29.57; Portland, 29.55; Eastport and Chatham, 29.56; Anticosti, 29.46. Cautionary signals, ordered for this storm on Lakes Michigan and Erie, were justified only at scattering stations. The following reports furnished through the co-operation of "The New York Herald Weather Service," probably indicate the presence of this storm during its passage eastward over the ocean: 30th, S. S. "W. A. Scholten," in N. 41° 21′, W. 53° 19′, barometer 29.55, n.w., force 5, rough sea; s. s. "Lepanto," in N. 43° 29′, W. 44° 53′, strong south wind, force 6, overcast and rain.

IV.—At the afternoon report of the twenty-ninth a depression was developed in Dakota. On the thirtieth it moved slowly over Minnesota with light rains reported from all stations in the northwest and upper lake region; the lowest pressure reported was at Saint Paul, 29.52, or 0.41 inch below the normal. On the thirty-first the storm-centre pursued, with a considerable increase of energy, an easterly track over lakes Michigan and Huron. It was during the progress of this low area that the maximum temperatures for the month was reported from the lower lakes and the middle Atlantic states. Cautionary signals were ordered for this storm on Lake Erie, the following maximum velocities being reported: Cleveland, 28, sw.; Sandusky, 36, nw.; and on the Atlantic coast, Hatteras, 52, sw.; Kittyhawk, 40, sw.; Delaware Breakwater, 40, sw.; Cape May, 40, s.; Atlantic City, 28, s.; Barnegat, 29, s.; Sandy Hook, 29, sw.; New London, 28, sw.; Newport, 31, s.; Provincetown, 32, s.

HURRICANE CHART.

Chart viii. exhibits the tracks of some of the more memorable tropical hurricanes of the West Indies that have been observed since the establishment of the Signal Service. The following letter published in connection with this chart, explains the intention of the Chief Signal Officer to provide for a more extensive and elaborate system of storm warnings with respect to the tropical hurricanes which may menace our coasts:

Washington City, June 17, 1882.

Captain ————,
Commanding Steamship ————,
Care of ————.

SIR: I have the honor to inform you that the following Signal Service observers, stationed in the West India Islands, have *special* instructions to be vigilant during the hurricane season to obtain timely notice of hurricanes and telegraph the information to this service, for the benefit of the shipping interests of the north Atlantic and Gulf coasts:

Mr. A. Van Coneghan, Havana, Cuba;
Mr. ——— ———, St. Thomas, St. Thomas;
Mr. Edwin Racker, Bridgetown, Barbadoes;
Mr. Maxwell Hall, Kingston, Jamaica;
Mr. Robert Mason, Santiago de Cuba, Cuba;
Mr. L. V. Bigard, Pointe-à-Pitre, Guadeloupe.

You are also informed that the State Department has been requested to instruct its consular officers and agents, at the points named below, to telegraph promptly to the United States, notice of hurricanes, when reported to them by ship-masters:

Cienfuegos, Cuba;	Port-of-Spain, Trinidad;
Kingston, St. Vincent;	St. George, Grenada;
San Juan, Porto Rico;	Roseau, Dominica;
St. Johns, Antigua;	St. Pierre, Martinique.

The Chief Signal Officer requests, in case you encounter a hurricane or have knowledge of a hurricane then existing, that you will, on entering any of the ports before mentioned, communicate at once your information to the representative of the United States Signal Service, so that timely warning may be given, on the sea-board of the United States, of approaching danger. The information, even if several days old, may be very valuable.

The hurricane reported last August north of St. Thomas was five days in reaching the Georgia and South Carolina coasts; and the disastrous hurricane of August, 1873, was known on the 18th of August at St. Thomas, a week before the damage was done on the American coast, and on the 21st the residents of the Bermudas were fully aware of its existence, and could have foretold its track.

Thus, by timely warning from these outposts in the hurricane track, you may be the means, through the Signal Service of the United States, of averting danger and disaster; of saving life and property along our coasts; and of preventing vessels going to sea from sailing into the track of these dreadful storms.

Your co-operation is earnestly solicited in this important work. By it the Chief Signal Officer hopes to increase the efficiency of the storm-warning service along the Gulf and Atlantic coasts of the United States; in which all ship-masters, owners, agents, and underwriters have the greatest interest.

Herewith please find a chart, on which are traced the paths of some of the most prominent tropical hurricanes of the West Indies, that have prevailed since the establishment of the Signal Service of the United States.

I am, very respectfully, your obedient servant,

W. B. HAZEN,
Brig. & Bvt. Maj. Gen'l.
Chief Signal Officer, U. S. A.